

be provided by general hospitals. Dispersal of such a service to outside clinics and health centres must be avoided in future planning."

To the patient the ability to have an x-ray picture taken in the centre immediately before, during, or after, a consultation is of value both in saving time and in the speed with which he can be told the results of the examination. To the family doctor the immediate availability of the department in the centre means that more rapid progress can be made both in diagnosis and in patient management. It is one of the factors which increases "job satisfaction". The health centre department allows the general practitioner to see x-ray pictures after they have been processed and to discuss them in greater detail with the radiologist when he is reporting on the film. He thus can become more aware of the values and limitations of x-ray diagnosis and can become more confident at interpreting films before they have been formally reported. The term "allows" is used specifically because personal consultations between the referring doctor and the radiologist have unfortunately been infrequent. The most likely reason for the lack of contact is the difficulty many general practitioners find in being available during the limited time when the radiologist is in the centre.

These advantages will only accrue if the patient can have his x-ray examination at the time of his consultation. An objection to installing expensive equipment in a health centre is that it will be idle for part of the day if used part time or full time with a suboptimal patient load. On the basis of the current radiographers' salaries the additional cost of keeping the health

centre unit open for 10 sessions per week would be £690. If the annual referral rate seen in the first year of this unit remains steady with the unit open for 10 sessions the total cost of the department would be £3,709. The cost per x-ray film would then be £1.49p (or 90p if only supplies and salaries are included in the costs). Despite the increase in costs and despite the patient referral rate being lower than that which the radiographers consider as being optimum there is a strong case for the health centre unit being open for five days weekly.

We thank Mrs. Anne Baker and Mrs. Ann Gillion for their help in collecting the data; and Dr. E. T. Haraldsson, Sister Jan Rae, and the Woodside Health Centre doctors for their help in the preparation of this paper.

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# Contemporary Themes

## Speedboat Propeller Injuries

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*British Medical Journal*, 1974, 2, 427-429

### Summary

**Six patients are reported who were severely injured by high-speed boat propellers. With reasonable precautions such accidents need never occur, and people should be more aware of these and ensure that safety measures are enforced.**

### Introduction

People may be injured during water skiing by contact with the boat or skis, by entanglement with the rope, by collision with obstructions in the water, or even by hard falls into the water at speed. The acceleration associated with "dock starts" can also produce less severe injuries. The mechanisms of water skiing injury have been discussed by McCarthy.<sup>1</sup>

With the increasing emphasis being laid on leisure all sports, and especially water sports, are becoming more popular so the number of injuries is likely to increase. Of all injuries those caused by the propeller can be the most severe. This paper describes six patients injured by high speed boat propellers

Not all the patients were engaged in water skiing but the injuries could be similar. It is hoped that by publicizing these cases awareness of danger may attract greater safety consciousness.

### Case 1

While this man, aged 29 years, was pushing a boat off a sandbank the engine fired. The boat passed over him causing 15 lacerations across the back, one of which transected the sacrum exposing the rectum. He also sustained severe lacerations of the left popliteal fossa, the left lower leg, and a compound fracture dislocation of the right ankle (fig. 1).

His left leg was amputated below the knee. Reduction and debridement of the right ankle were performed. The back lacerations, several of them deep, were sutured. The sacral segments were opposed with monofilament nylon. As the rectum was bruised a transverse colostomy was performed.

A year later he was well and walking satisfactorily on his prosthesis though the right ankle was not completely healed because of osteomyelitis. A small area of anaesthesia on the saddle area was not a great disability. Sphincter control was normal.

### Case 2

This 27-year-old woman fell while water skiing in the late afternoon. While returning to pick her up the driver was dazzled by the setting sun reflected from the sea and ran over her. She sustained a compound comminuted subtrochanteric fracture of the right femur through a buttock laceration. She also had deep lacerations of the left thigh, left



FIG. 1.—Case 1. Lacerations across back caused by speedboat propeller.

popliteal fossa, and left calf necessitating through-knee amputation.

After more than six months in hospital and rehabilitation units she was discharged walking on her prosthesis though not fully confident.

### Case 3

This 25-year-old man was sitting on the front of a Gemini inflatable boat powered by an outboard engine. The painter was looped around his waist. A high wave dislodged him. He passed under the boat and was held there by the rope around his waist so that his legs were under the propeller. In spite of the possibility of drowning and traumatic amputation of the legs his injuries were relatively slight: multiple lacerations of left lower leg and foot, deep lacerations around the right ankle severing the peroneal tendons, and lacerations of the right calf. These healed well after debridement, delayed primary suture, and skin grafting. His total hospital care lasted 27 days.

### Case 4

This 21-year-old man was sitting on the edge of an inflatable Gemini craft powered by an outboard engine. During a fast sharp turn he was thrown off. The propeller was out of the water and the boat was sliding laterally as it had no keel. It is thought he was hit by the propeller before he entered the water.

He sustained a deep laceration of the right upper arm, which damaged triceps brachii and severed the ulnar nerve. The left axilla was also lacerated but no significant structures were damaged.

He was in hospital for two months and even then had considerable disability, not only from the ulnar nerve lesion but from fibrosis in the right triceps muscle.

### Case 5

The mechanism of this 20-year-old man's accident is not known. His injuries were: a 15 cm laceration along the anteromedial aspect of right upper arm, damaging the fibres of the biceps muscle and severing the ulnar nerve 8 cm above the elbow (fig. 2); a compound fracture of distal phalanx of the right little finger; four lacerations of the right chest wall, not involving the rib cage.

The wounds and the ulna nerve were primarily sutured. He was in hospital for 23 days. After two months the elbow and finger had regained good movement, but no evidence of nerve regeneration was detectable four months after the injury.



FIG. 2.—Case 5. Laceration along anteromedial aspect of right upper arm.

### Case 6

The mechanism of injury to this 24-year-old man is not known. The propeller caused a laceration starting just above the right lateral malleolus and ending 3 cm from the base of the little toe. The fibula was divided just above the malleolus. The cuboid, lateral cuneiform, and fourth metatarsal were divided by the propeller blade with the overlying soft tissue.

The wound was not very contaminated, and screw fixation of the fibula and lateral cuneiform was performed. Primary healing occurred. He was discharged from hospital after 46 days fully weight-bearing with good movement.

The screws needed removal after four months and he was discharged from outpatient review after eight months with limited eversion of the foot and reduced abduction of the forefoot.

### Discussion

Clinically many of these wounds are contaminated by sand and debris and often occur in water contaminated by sewage. In spite of this, infection was not a great problem in these cases. If tissue damage is extensive, however, delayed primary suture should be considered, particularly if amputation is necessary, when the consequences of wound infection can be especially severe.

Clearly some risk attaches to any occupation. With reasonable precautions, strictly enforced, accidents associated with water skiing should be reduced to a minimum, and propeller injuries should never occur. In a review of water skiing injuries in general Romano *et al.*<sup>2</sup> while mentioning injuries caused by the boat stated they should not occur if the rules are followed. Though well run clubs publicize and enforce safety rules, casual skiers and many commercial skiing enterprises do not have such high standards, and this is when accidents happen.

The British Water Ski Federation publishes rules which are very comprehensive.<sup>3</sup> Among many other points they emphasize that water skiing and swimming must be separated. They state that the towing boat should hold two competent persons, one to drive and one to watch the skier, and also they lay down procedures when more than one boat is in the same stretch of water. Improper action in these three situations is probably the cause of most severe injuries.

The case histories illustrate the potential severity of injuries in this sport. All members of the medical profession associated with it should try to reduce their frequency by ensuring safety rules are published and enforced.

I am grateful to Wing Commander D. J. Davidson for the details of cases 5 and 6 which were under his management; also to the Director General of Medical Services (R.A.F.) for permission to submit this paper for publication.

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